Farm Methane Recovery in Vermont
Outline of Barriers
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Introduction:

There are many "barriers" that keep farmers from investing in methane recovery and use systems that might yield considerable benefits for them. The goal of this project is to identify as best we can what those barriers are, and think comprehensively about strategies to overcome them. We did not just want to sink money into an experiment that showed once again that use of methane "could" work, we want to figure what it will take to make this technology one that becomes a logical, normal investment for farmers to make as part of a healthy farming operation.

We are beginning to develop a "capability" in Vermont to address those barriers in an ongoing, sustained way (somewhat like the partnership among Department of Public Service, Forest Parks and Recreation and the Department of Economic Development and many private sector partners on wood chip use in Vermont). The advisory committee overseeing this project includes representatives from the Vermont Department of Agriculture, the Vermont Department of Public Service, the USDA Natural Resource Conservation Service, utilities, Senator James Jefford's office, the Vermont Agency of Natural Resources, renewable energy consultants and farmers.

Project Mission Statement:

This project will identify and help overcome key strategic hurdles to widespread adoption of methane recovery and use technologies by Vermont farmers.
The project will consider methane recovery and use in a broad context, taking into account its potential benefits as a component of a comprehensive manure and nutrient management system, as a renewable energy source and as a strategy for greenhouse gas reduction.
To accomplish this mission the project will:

- research methods to reduce costs and increase the efficiency of methane recovery technologies and use;
- develop partnerships with experts in manure management and water quality protection;
- assess the potential economic benefits of methane as an energy source;
- establish sites to demonstrate the viability of the technology; and
- publicize the progress of the project to stimulate demand.

The following list of market barriers and possible strategies to overcome them was prepared by Jeff Forward from input by the advisory committee overseeing this project.

I. **Financial**

A. **Description of barrier:** Methane recovery systems are expensive. For the average 300 - 500 cow dairy farm, capital costs can range from $100,000 -$500,000 or more depending on site characteristics and what is included in the manure handling system. (**Note:** we may consider other strategies for farms smaller than this size. Conventional wisdom and technology suggests, however that these larger farms are most likely to have best potential at first)

1. **Possible solutions:**
   - a. Financing
     - (1) Farm Service Agency
     - (2) Vermont Economic Development Authority
     - (3) Private venture capital
   - b. Cost sharing
     - (1) Natural Resource Conservation Service
   - c. Grants
     - (1) Department of Energy
     - (2) Agencies concerned with water quality
       - (a) Lake Champlain Basin Program
   - d. Additional Revenues
     - (1) Moo Doo soil amendments
     - (2) Sale of Electricity or waste heat
     - (3) Sale of greenhouse gas offsets
     - (4) Tipping fees for composting or digesting industrial or commercial waste
   - e. Production savings or offsets
     - (1) electricity
     - (2) space or water heat
     - (3) bedding
     - (4) fertilizer and soil amendments

II. **Technological**

A. **Description of Barrier:** Existing and failed systems typically have difficulty managing sediment build-up in digester reactor.

1. **Possible solution**: R&D

B. **Description of Barrier:** Separating liquids from solids after digestion is expensive and existing equipment has maintenance problems

1. **Possible solution**: R&D

C. **Description of Barrier:** Retention time of 20 - 30 days, as is typical, requires a sizable vessel. If the retention time could be reduced, it would cut capital costs significantly.

1. **Possible solution**: R&D

D. **Description of barrier:** Quality and purity of gas for various uses is uncertain (moisture, other gasses)

1. **Possible solution**: R&D

E. **Description of barrier:** Sale of electricity to utility is complicated and potentially expensive to set-up.

1. **Possible solutions:**

a. Net metering, if the rules are appropriately written and the on-site equipment is sized correctly may resolve this barrier. For those farms that don't fit net-metering rules, each contract will likely have to be negotiated separately.

b. On-site use of electricity may provide enough benefit to make system cost-effective.

c. If retail competition of electricity happens in Vermont, this renewable fuel could become an attractive source to fill renewable portfolios, thereby allowing for premium pricing.

d. Green pricing of renewable fuels

III. **Infrastructure**

A. **Description of barrier:** While not new technology, these systems are still relatively rare. Less than 3 dozen systems exist in the country at this time. There is no standardized system that can be bought off the shelf. Nor is there an existing network of companies that sell and maintain all of the components. Each system must be designed individually.

1. **Possible solutions**

a. Encourage commercialization of technology through R&D grants and loan guarantees for business start-up.

b. Research existing technology providers and gauge their interest in establishing business opportunities in Vermont.

c. Develop "business allies", such as agricultural co-ops, who might work with farmers to help provide "turnkey" systems.

IV. **Informational**

A. **Description of barrier:** Many farmers who may be interested in this technology don't know much about it.

1. **Possible Solutions:**

a. Develop demonstration projects to show feasibility

b. Sponsor informational forums to educate farmers about technology and applicability.

c. Provide field trips to existing sites for interested potential participants.

B. **Description of Barrier:** We do not know how many farms in Vermont or specifically which ones where a system could be installed cost-effectively, or where new manure handling systems may be planned that could create opportunities for this technology.

1. **Possible solutions**:

a. Inventory all farms over 300 milkers

b. Interview on-site farm technicians for list of potential sites and then interview those farmers to gauge interest.

C. **Description of barrier:** We have not quantified all of the potential benefits to air quality, water quality, odor reduction, farm economy and solid waste reduction by embracing this technology. Nor have we quantified the potential need of industrial applications

1. **Possible solution:**

a. Collate existing research

b. Inventory farms and food waste industries
c. Set-up demonstration projects that document measurable inputs and outputs.

V. **Technical Assistance:**

A. **Description of barrier:** If a farmer is interested in exploring the feasibility of a project, engineering costs can be expensive.

1. **Possible Solutions**:

a. AgStar Farmware software provides a first cut feasibility analysis for the lay person.
b. Phil Lusk from the Northeast Regional Biomass Program may be able to provide better more customized feasibility analysis for interested participants.
c. Once a participant has determined cost-effectiveness and wants to proceed with hard engineering, Agstar program or Natural Resource Conservation Service or other agencies may be able to provide design assistance.

VI. **Other less defined barriers**

A. **Description of barrier:** Reluctance to commit to new management task.

1. Operating a digester is a significant management task on the order of ½ hour per day plus scheduled maintenance of equipment and unscheduled problem solving. Many farmers are already beyond, at or close to capacity for the number of employees and tasks they want to manage.
2. The unemployment rate in many parts of Vermont is relatively low and farm labor is difficult to get. Adding another task that would require additional labor could inhibit some farmers from committing to a labor intensive technology.

a. **Possible solution**: Set up a circuit rider who can provide routine maintenance for a fee or a share in whatever revenue is generated. An Energy Service Company or a cooperative arrangement could be feasible if enough farmers are interested.

(1) If a community or cooperative system is set-up, other for profit cooperatives may be enticed into investing, such as Agrimark or Cabot.

B. **Description of barrier:** Few people like to be pioneers in a new technology. Most people like to know someone or several people have done it before successfully.

1. Establish several pilot projects in different locations and in different circumstances around the state.
2. Establish field trips to existing operations:

a. AA Dairy in Candon NY
b. Foster Bros, Middlebury, VT
c. Cushman Dairy, CT
d. Freund Dairy, CT
e. Mason/Dixon Dairy, PA